

**ALLEGHENY COUNTY HEALTH DEPARTMENT  
AIR QUALITY PROGRAM**

November 19, 2009

**SUBJECT: Renewal Title V Operating Permit Application**  
NRG Energy Center Pittsburgh LLC.  
111 South Commons  
Pittsburgh, PA 15212

**RE:** Operating Permit No. 0022  
Steam and Chilled generation plant

**TO:** Sandra L. Etzel  
Chief Engineer

**FROM:** Hafeez A. Ajenifuja.  
Air Quality Engineer

**FACILITY DESCRIPTION:**

The NRG Energy Center Pittsburgh, LLC facility is a commercial district heating and cooling plant located in the city of Pittsburgh, Allegheny County. The plant supplies steam for space heating and hospital sterilization and chilled water for refrigeration and summer air conditioning to commercial and institutional sites in that area. The plant is composed of five boilers which fire natural gas as their primary fuel and have the capacity to fire no. 2 fuel oil with sulfur content of 0.05%, in lieu of natural gas at times of emergency or natural gas curtailment with the exception of boilers 4 & 5 which does not have the capability to fire fuel oil. Boiler 5 will only be use for emergency purpose for a maximum of 500 hours a year and it is physically located on the premises of Allegheny General Hospital. Additional equipment used for chilled water production includes various turbines, chillers and compressors, an 8-cell 30,000 gpm cooling tower and a 2-cell 7,200 gpm cooling tower. The facility also has two (2) oil fired and one natural gas fired emergency generators rated at 350 kW, 250 kW and 250 kW respectively. The three (3) generators operate with a limited operating hour of 500 hrs/yr.

The facility is a major source of nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO) and minor source of particulate matter (PM), PM<sub>10</sub>, sulfur dioxide (SO<sub>2</sub>), volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) as defined in section 2101.20 of Article XXI.

The facility withdrew the installation permit No. 0022-I002 issued on August 9, 2005 that allows the facility to burn No. 2 fuel oil in boilers 1-3 on a discretionary basis during emergency or natural gas curtailment. Therefore, the facility is currently not allowed to burn No.2 fuel oil in boilers 1-3 except as a backup to natural gas fuel in emergency situations where natural gas is not available or during periods of natural gas curtailment. The facility shall notify the Department with justification of the need to combust no.2 fuel oil before burning the fuel oil.

The Department estimated the fuel oil emissions of boilers 1-3 based on 500 hours each of emergency operation.

**PROCESS DESCRIPTION:**

This is a Title V renewal application for NRG Energy Center Pittsburgh, LLC located in the City of Pittsburgh, Allegheny County. The original operating permit was issued on April 8, 2002 and the facility's operations and processes are still the same as in the original operating permit.

**EMISSION CALCULATION:**

Emissions from each of the five (5) boilers and combined emission of all the five (5) boilers firing natural gas are shown below:

Pollutants	Emissions									
	Boilers <sup>a</sup> 1 & 2 92 MMBtu/hr Each		Boiler 3 131.1 MMBtu/hr		Boiler 4 24 MMBtu/hr		Boiler 5 46.08 MMBtu/hr		Combined Emission	
	Lbs/hr	Tons/yr <sup>b</sup>	Lbs/hr	Tons/yr <sup>b</sup>	Lbs/hr	Tons/yr <sup>b</sup>	Lbs/hr	Tons/yr <sup>b</sup>	Lbs/hr	Tons/yr <sup>b</sup>
PM/PM <sub>10</sub>	0.74	3.24	1.0	4.38	0.18	0.79	0.34	0.09	3.0	11.74
NO <sub>x</sub>	13.34	54.2	19.01	77.3	0.91	4.0	4.61	1.15	51.21	190.85
SO <sub>x</sub>	0.06	0.24	0.08	0.35	0.014	0.06	0.03	0.01	0.244	0.9
CO	7.58	33.2	10.8	47.3	3.6	15.77	3.80	0.95	33.36	130.42
VOC	0.50	2.2	0.7	3.1	0.19	0.84	0.25	0.06	2.14	8.4

<sup>a</sup> The emission is for each boiler

<sup>b</sup> A year is defined as any consecutive 12-month period

**Sample Calculation (PM for boiler firing natural gas)**

PM:  $(0.008 \text{ lb/MMBTU}) * (92 \text{ MMBtu/h}) = 0.74 \text{ lb/hr}$

$(0.74 \text{ lbs/hr}) * (2 \text{ boilers}) = 1.47 \text{ lbs/hr}$

$(0.74 \text{ lb/hr}) * (8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) = 3.24 \text{ tpy}$

$(3.24 \text{ tons/yr}) * (2 \text{ boilers}) = 6.5 \text{ tpy}$

Emissions from each of the three (3) boilers firing #2 fuel oil are shown below:

Pollutants	Emissions							
	Boilers 1 92 MMBtu/hr		Boilers 2 92 MMBtu/hr		Boiler 3 131.1 MMBtu/hr		Combined Emission	
	Lbs/hr	Tons/yr <sup>a</sup>	Lbs/hr	Tons/yr <sup>a</sup>	Lbs/hr	Tons/yr <sup>a</sup>	Lbs/hr	Tons/yr <sup>a</sup>
PM/PM <sub>10</sub>	1.38	0.35	1.38	0.35	1.97	0.49	4.73	1.19
NO <sub>x</sub>	13.25	3.3	13.25	3.3	22.65	5.66	49.15	12.26
SO <sub>x</sub>	4.7	1.2	4.7	1.2	7.4	1.90	16.8	4.3
CO	3.31	0.83	3.31	0.83	4.72	1.18	11.34	2.84
VOC	0.19	0.05	0.19	0.05	0.19	0.45	0.57	0.55

<sup>a</sup> A year is defined as any consecutive 12-month period

Sample Calculation (SO<sub>x</sub> for boiler firing fuel oil)

$$\text{SO}_x: (142\text{lb}/10^3\text{gal} * 0.05) * (92 \text{ MMBtu}/\text{h}) * (\text{gal}/0.140 \text{ MMBtu}) = 4.67 \text{ lb}/\text{hr}$$

$$(4.67 \text{ lb}/\text{hr}) * (500 \text{ hr}/\text{yr}) / (2000 \text{ lb}/\text{ton}) = 1.2 \text{ tpy}$$

Note: The SO<sub>x</sub> emission factor was multiplied by sulfur content of 0.05%

**Emissions from the Emergency Generators and Cooling Towers are shown below:**

Pollutants	Emissions									
	Emergency Generators						Main Cooling Tower		No. 6 & 7 Cooling Towers	
	350 kW Oil fired		250 kW Oil fired		250 kW NG fired		lbs/hr	Tons/yr <sup>a</sup>	lbs/hr	Tons/yr <sup>a</sup>
lbs/hr	Tons/yr <sup>a</sup>	lbs/hr	tons/yr <sup>a</sup>	lbs/hr	Tons/yr <sup>a</sup>					
PM/PM <sub>10</sub>	0.18	0.04	0.84	0.21	0.06	0.01	0.82	3.6	0.71	3.11
NO <sub>x</sub>	9.63	2.41	11.9	2.98	11.83	2.96	NA	NA	NA	NA
SO <sub>x</sub>	0.63	0.16	0.78	0.20	0.002	0.004	NA	NA	NA	NA
CO	2.35	0.59	2.57	0.64	10.79	2.70	NA	NA	NA	NA
VOC	0.32	0.08	0.97	0.24	0.35	0.09	NA	NA	NA	NA

<sup>a</sup>A year is defined as any consecutive 12-month period

**Emission factor for the boilers and emergency generators are shown below:**

Pollutants	Emission Factors								
	Emergency Generators			Boilers					
	350 kW Oil fired <sup>b</sup>	250 kW Oil fired	250 kW NG fired <sup>c</sup>	Boilers 1-2		Boiler 3		Boiler 4	Boiler 5
Firing NG				Firing fuel oil	Firing NG	Firing fuel oil	Firing NG	Firing NG	
	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu	Lbs/MMBtu
PM/PM <sub>10</sub>	0.05	0.28 <sup>a</sup>	0.00008	0.008 <sup>a</sup>	0.015 <sup>a</sup>	0.008 <sup>a</sup>	0.015 <sup>a</sup>	0.008 <sup>a</sup>	0.008 <sup>c</sup>
NO <sub>x</sub>	2.75	4.41 <sup>c</sup>	4.08	0.145 <sup>b</sup>	0.5112	0.145 <sup>b</sup>	0.1728 <sup>c</sup>	0.038 <sup>b</sup>	0.098 <sup>c</sup>
SO <sub>x</sub>	0.18	0.29 <sup>c</sup>	0.0006	0.0006 <sup>a</sup>	0.05 <sup>c</sup>	0.0006 <sup>c</sup>	0.056 <sup>c</sup>	0.0006 <sup>c</sup>	0.0006 <sup>c</sup>
CO	0.67	0.95 <sup>c</sup>	3.72	0.0824 <sup>c</sup>	0.036 <sup>c</sup>	0.0824 <sup>c</sup>	0.036 <sup>c</sup>	0.15 <sup>b</sup>	0.08 <sup>c</sup>
VOC	0.09	0.36 <sup>c</sup>	0.12	0.0054 <sup>c</sup>	0.0024 <sup>c</sup>	0.0054 <sup>c</sup>	0.243 <sup>c</sup>	0.008	0.0054 <sup>c</sup>

<sup>a</sup> The emission factor is from Article XXI

<sup>b</sup> The emission factor is vendor/manufacturers guarantee

<sup>c</sup> The emission factor is from AP-42. The fuel oil SO<sub>x</sub> emission factor for the boilers was multiplied by sulfur content 0.05%

Sample Calculation (PM for 350 kW Generator firing #2 fuel oil)

$$140,000 \text{ Btu}/\text{gal} (\text{heating value}) * (12,500 \text{ gal}/\text{yr}) * (\text{yr}/500\text{hr}) = 3.5 \text{ MMBtu}/\text{hr}$$

$$\text{PM}: (0.05 \text{ lb}/\text{MMBtu}) * (3.5 \text{ MMBtu}/\text{h}) = 0.18 \text{ lb}/\text{hr}$$

$$(0.18 \text{ lb}/\text{hr}) * (500 \text{ hr}/\text{yr}) / (2000 \text{ lb}/\text{ton}) = 0.045 \text{ tpy}$$

**RENEWAL OPERATING APPLICATION COMPONENTS:**

1. Renewal Permit Application No. 0044 was received on October 6, 2006.
2. E-mail correspondence dated July 13, 2009 (Request for generators Calculation & emission factor);
3. E-mail correspondence dated July 16, 2009 ((Request for generators Calculation & emission factor);
4. E-mail correspondence dated July 17, 2009 (Revised generators calculation);
5. E-mail correspondence dated July 20, 2009 (Revised generators calculation);
6. E-mail correspondence dated July 21, 2009 (Revised generators calculation);
7. E-mail correspondence dated July 31, 2009 (Revised generators calculation).

**METHOD OF DEMONSTRATING COMPLIANCE:**

The facility will demonstrate compliance by complying with the weekly inspections of the boiler combustion equipment and cooling towers, fuel certifications with sulfur content of 0.05% from fuel oil suppliers along with record keeping and reporting requirements that include inspection, maintenance and repair data for the boiler and cooling towers and monthly usage of natural gas and fuel oil. Total Dissolve Solid (TDS) for the cooling towers shall be determined by conductivity testing. See the Title V Permit No. 0022, for the specific conditions for determining compliance with the applicable requirements.

**REGULATORY APPLICABILITY:**

**1. Article XXI Requirements for Issuance:**

The requirements of Article XXI, Parts B and C for the issuance of this renewal permits have been met for this facility. Article XXI, Part D, Part E & Part H will have the necessary sections addressed individually.

**2. Testing Requirements:**

Pursuant to the RACT requirement of §2105.06.b.4.B of Article XXI, the facility will test boilers 1-3 firing natural gas only for NO<sub>x</sub> emissions every two (2) years (24 consecutive months) according to approved U.S. EPA test methods and Section 2108.02 of Article XXI.

The facility shall also, starting from September 15, 2010 and once every five (5) consecutive years thereafter test boilers 1-3 firing No. 2 fuel oil to demonstrate compliance with the fuel oil NO<sub>x</sub>, particulate and SO<sub>x</sub> emissions according to approved U.S. EPA test methods and Section 2108.02 of Article XXI.

**3. New Source Performance Standards (NSPS):**

The boilers 1-3 are not subject to the NSPS conditions because boilers 1-2 were installed in 1964 and boiler 3 was installed in 1972.

Boiler 4 is subject following section:

- §60.48.c. (f): Reporting of the fuel (natural gas) usage and certifications that demonstrate initial and continuing compliance. The fuel certification shall consist of the name of the supplier. The permittee must certify that the fuel records submitted represent all the fuel combusted during the reporting period.

Boiler 5 is not subject to NSPS because it is only use during emergency.

4. **NESHAP and MACT Standards:**

The facility is not subject to any NESHAP requirements.

5. **Compliance Assurance Monitoring:**

The Compliance Assurance Monitoring (CAM) rule found in 40 CFR 64 is not applicable to the facility pursuant to §64.2(a)(2), which states “the CAM requirements apply to unit that uses control device to achieve compliance with any such emission limitation or standard”. Therefore, since the facility does not have any control device, it is exempt from the CAM requirement.

6. **EMISSIONS SUMMARY:**

The allowable emission summary for the facility is given in Table below:

<b>EMISSION SUMMARY</b>	
<b>Pollutant</b>	<b>Annual Emissions (tons/year)</b>
PM/PM <sub>10</sub>	<b>19.45</b>
NO <sub>x</sub>	<b>190.85</b>
SO <sub>x</sub>	<b>4.37</b>
CO	<b>130.42</b>
VOC	<b>8.38</b>

**RECOMMENDATIONS:**

All the sources, operations and conditions are still the same as in the original permit. All applicable Federal, State, and County regulations have been addressed in the permit application. I recommend the issuance of the operating permit No. 0022.